CDR application in the western US

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Western Region RCSD

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Outline

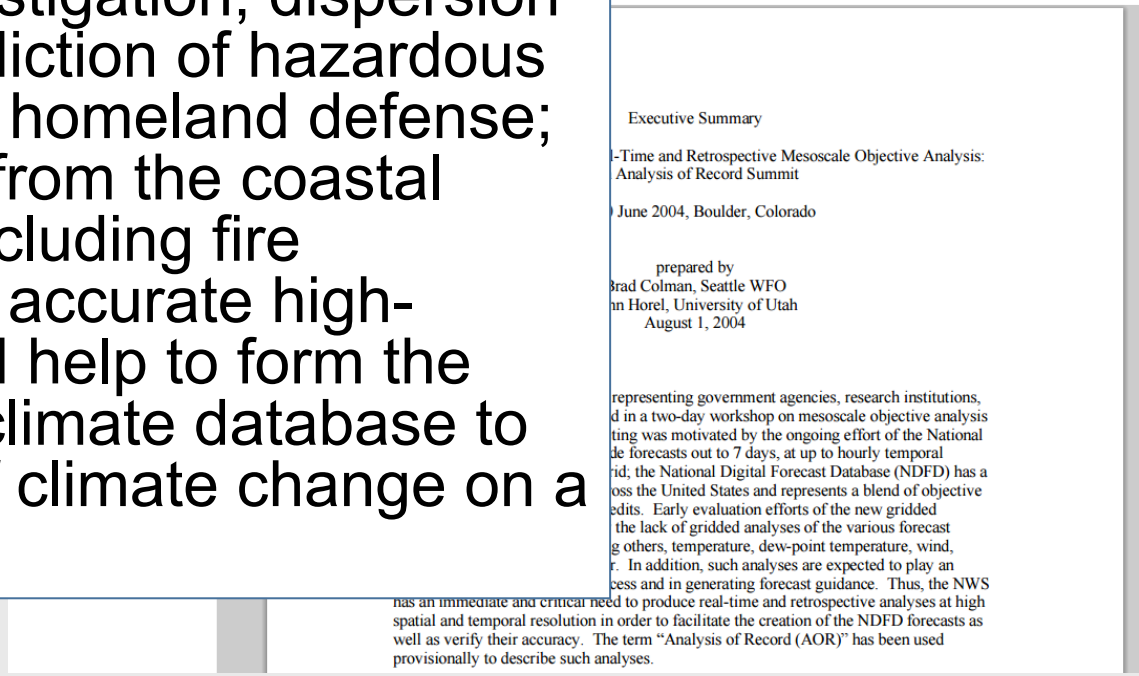
- Overarching need
- User Base
- Example: Improving Seasonal prediction

Overarching Need

- Lengthy history of documenting needs for a long term, temporally consistent, high resolution, and near real time updating **analysis of record** from multiple communities of practice:
  - Western water resources
  - Wildfire
  - Insurance
  - Transportation management
  - Emergency management and response

Example: 2004 AOR Workshop

"Demands for high-resolution objective analyses are growing rapidly across the environmental community to support such activities as: mesoscale modeling for both operational weather forecasting and fundamental scientific investigation; dispersion modeling for real-time prediction of hazardous materials and air pollution; homeland defense; and environmental issues from the coastal zone to national forests, including fire management. Additionally, accurate high-resolutions analyses would help to form the basic building blocks of a climate database to help assess the impacts of climate change on a regional scale."



Executive Summary

-Time and Retrospective Mesoscale Objective Analysis:
Analysis of Record Summit

June 2004, Boulder, Colorado

prepared by
Brad Colman, Seattle WFO
an Horel, University of Utah
August 1, 2004

representing government agencies, research institutions,
d in a two-day workshop on mesoscale objective analysis
ting was motivated by the ongoing effort of the National
de forecasts out to 7 days, at up to hourly temporal
rid; the National Digital Forecast Database (NDFD) has a
oss the United States and represents a blend of objective
edits. Early evaluation efforts of the new gridded
the lack of gridded analyses of the various forecast
g others, temperature, dew-point temperature, wind,
r. In addition, such analyses are expected to play an
cess and in generating forecast guidance. Thus, the NWS
has an immediate and critical need to produce real-time and retrospective analyses at high
spatial and temporal resolution in order to facilitate the creation of the NDFD forecasts as
well as verify their accuracy. The term "Analysis of Record (AOR)" has been used
provisionally to describe such analyses.

Analysis of Record

NWS motivation:

- Real-time seamless verification
- Provide forecasters useful feedback
- Give forecasters a way to assess the initialization and
- Serves as input t term forecasts
- Contributes to th gridded climatolo
- Building block fo
- Hydrology applic

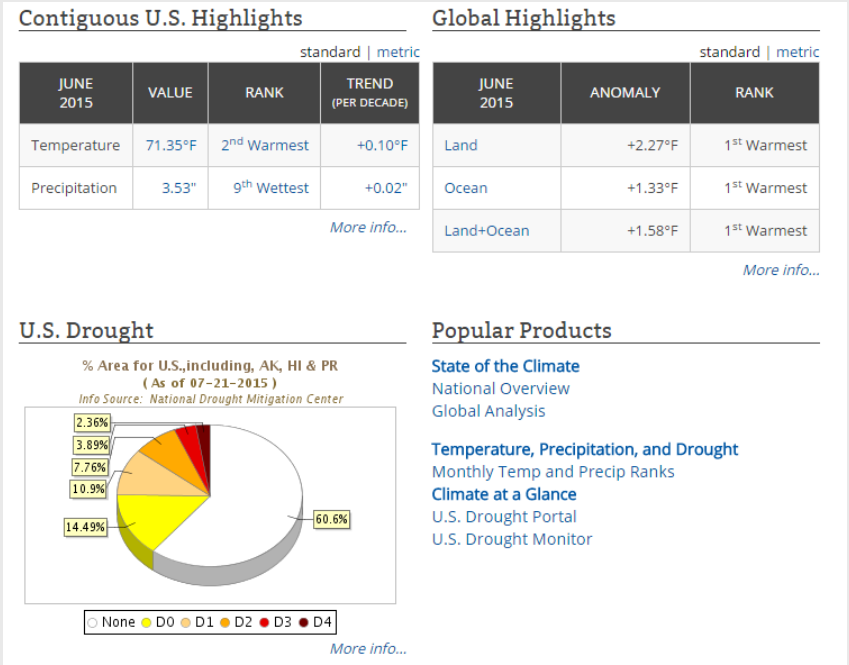
But, this is also a community problem

- Mesoscale model development and verification
- Transportation management
- Emergency management and response
- Hindcast testing of data assimilation schemes
- Private sector requirements
- Homeland defense
- Regional climate studies
- Etc.

Source: Brad Colman, 2004

User Base

- User base for specific CDR is likely a small but important group of decision makers requiring detailed and consistent climate data across a long-ish period of record



Contiguous U.S. Highlights

standard | metric

JUNE 2015	VALUE	RANK	TREND (PER DECADE)
Temperature	71.35°F	2nd Warmest	+0.10°F
Precipitation	3.53"	9th Wettest	+0.02"

More info...

Global Highlights

standard | metric

JUNE 2015	ANOMALY	RANK
Land	+2.27°F	1st Warmest
Ocean	+1.33°F	1st Warmest
Land+Ocean	+1.58°F	1st Warmest

More info...

U.S. Drought

% Area for U.S.,including, AK, HI & PR
(As of 07-21-2015)
Info Source: National Drought Mitigation Center

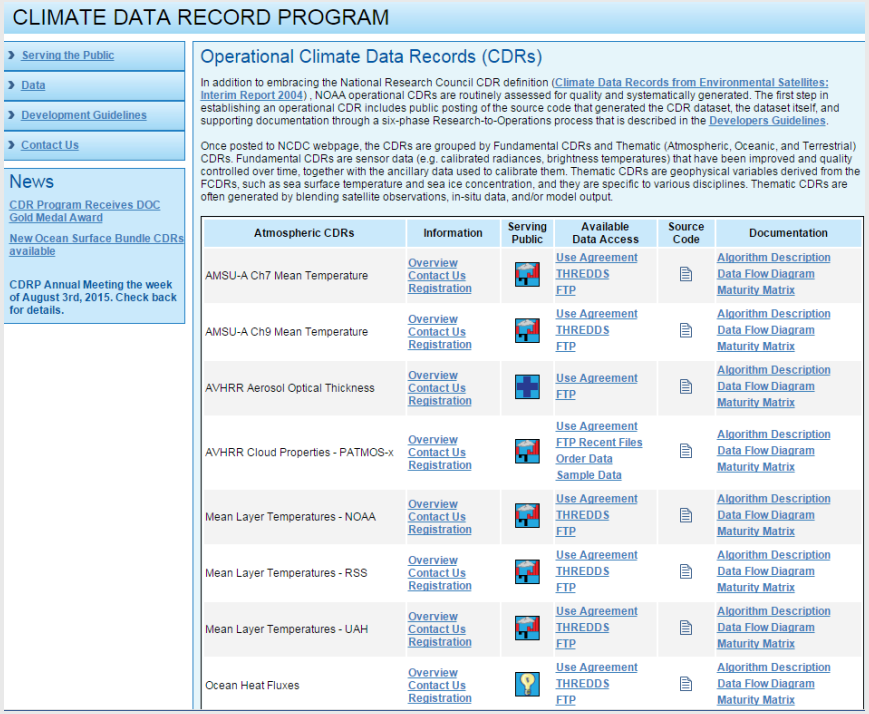
More info...

Popular Products

State of the Climate
National Overview
Global Analysis

Temperature, Precipitation, and Drought
Monthly Temp and Precip Ranks

Climate at a Glance
U.S. Drought Portal
U.S. Drought Monitor



CLIMATE DATA RECORD PROGRAM

- Serving the Public
- Data
- Development Guidelines
- Contact Us

News

CDR Program Receives DOC Gold Medal Award

New Ocean Surface Bundle CDRs available

CDRP Annual Meeting the week of August 3rd, 2015. Check back for details.

Operational Climate Data Records (CDRs)

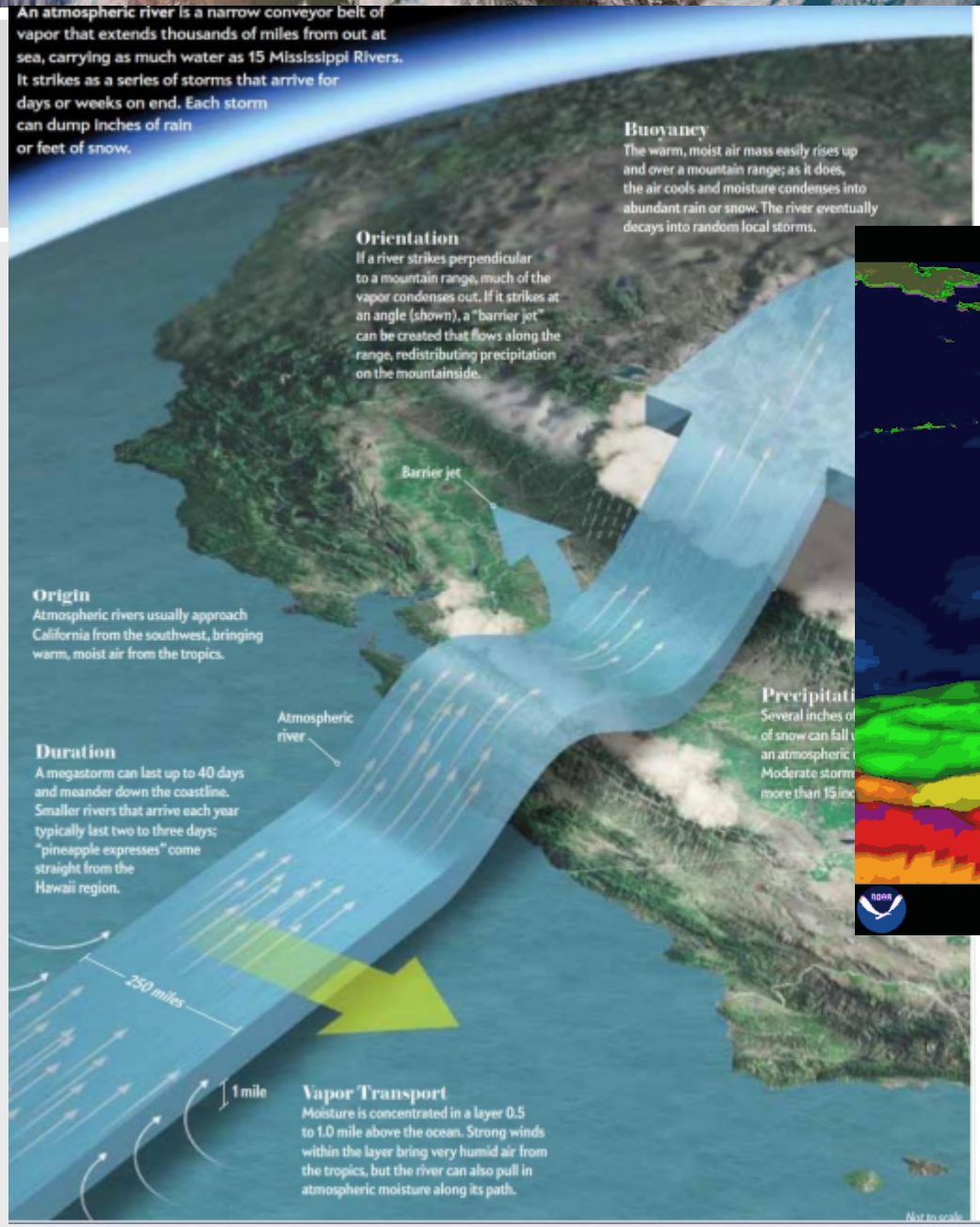
In addition to embracing the National Research Council CDR definition (Climate Data Records from Environmental Satellites: Interim Report 2004) , NOAA operational CDRs are routinely assessed for quality and systematically generated. The first step in establishing an operational CDR includes public posting of the source code that generated the CDR dataset, the dataset itself, and supporting documentation through a six-phase Research-to-Operations process that is described in the Developers Guidelines.

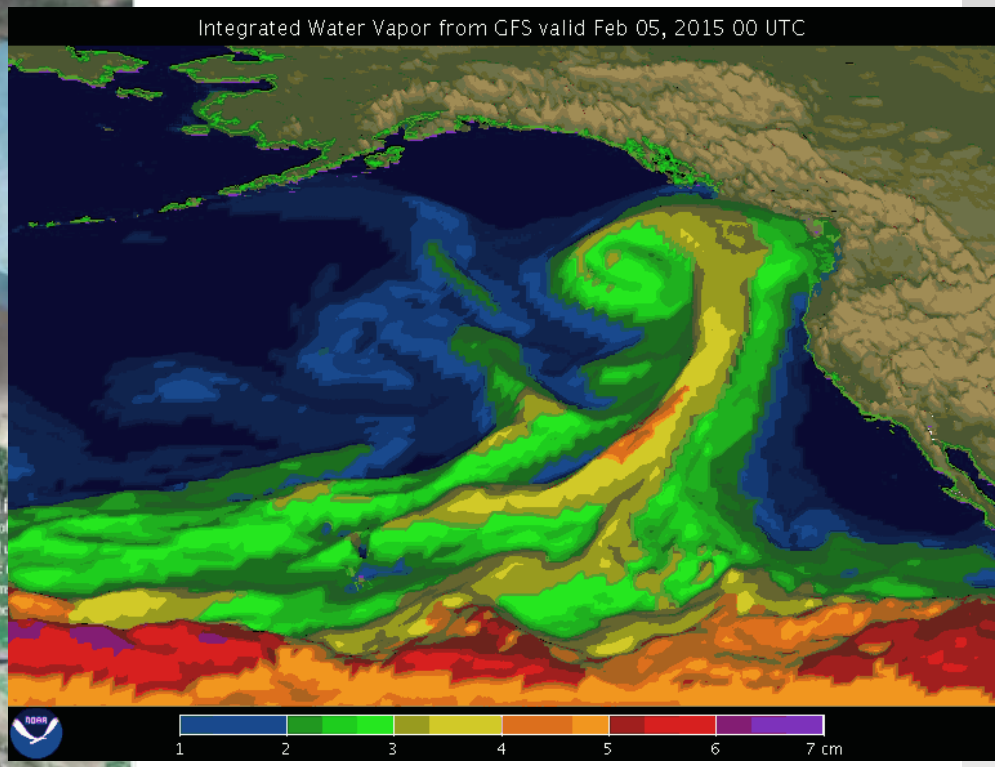
Once posted to NCDC webpage, the CDRs are grouped by Fundamental CDRs and Thematic (Atmospheric, Oceanic, and Terrestrial) CDRs. Fundamental CDRs are sensor data (e.g. calibrated radiances, brightness temperatures) that have been improved and quality controlled over time, together with the ancillary data used to calibrate them. Thematic CDRs are geophysical variables derived from the FCDRs, such as sea surface temperature and sea ice concentration, and they are specific to various disciplines. Thematic CDRs are often generated by blending satellite observations, in-situ data, and/or model output.

Atmospheric CDRs	Information	Serving Public	Available Data Access	Source Code	Documentation
AMSU-A Ch7 Mean Temperature	Overview Contact Us Registration		Use Agreement THREDDS FTP		Algorithm Description Data Flow Diagram Maturity Matrix
AMSU-A Ch9 Mean Temperature	Overview Contact Us Registration		Use Agreement THREDDS FTP		Algorithm Description Data Flow Diagram Maturity Matrix
AVHRR Aerosol Optical Thickness	Overview Contact Us Registration		Use Agreement FTP		Algorithm Description Data Flow Diagram Maturity Matrix
AVHRR Cloud Properties - PATMOS-x	Overview Contact Us Registration		Use Agreement FTP Recent Files Order Data Sample Data		Algorithm Description Data Flow Diagram Maturity Matrix
Mean Layer Temperatures - NOAA	Overview Contact Us Registration		Use Agreement THREDDS FTP		Algorithm Description Data Flow Diagram Maturity Matrix
Mean Layer Temperatures - RSS	Overview Contact Us Registration		Use Agreement THREDDS FTP		Algorithm Description Data Flow Diagram Maturity Matrix
Mean Layer Temperatures - UAH	Overview Contact Us Registration		Use Agreement THREDDS FTP		Algorithm Description Data Flow Diagram Maturity Matrix
Ocean Heat Fluxes	Overview Contact Us Registration		Use Agreement THREDDS FTP		Algorithm Description Data Flow Diagram Maturity Matrix

Example: Improving Seasonal Forecast

- Major unmet requirement from western water resources management agencies is need for seasonal forecasting.
- Atmospheric rivers responsible for majority of precipitation in California.
- Ability to incorporate information on frequency anomalies of atmospheric river events into a forecast system is limited by lack of historical information.
- Need being address through the development of an atmospheric river focused CDR in partnership with UC San Diego (Marty Ralph)


An atmospheric river is a narrow conveyor belt of vapor that extends thousands of miles from out at sea, carrying as much water as 15 Mississippi Rivers. It strikes as a series of storms that arrive for days or weeks on end. Each storm can dump inches of rain or feet of snow.
Buoyancy
The warm, moist air mass easily rises up and over a mountain range; as it does, the air cools and moisture condenses into abundant rain or snow. The river eventually decays into random local storms.
Orientation
If a river strikes perpendicular to a mountain range, much of the vapor condenses out. If it strikes at an angle (shown), a "barrier jet" can be created that flows along the range, redistributing precipitation on the mountainside.
Barrier jet
Origin
Atmospheric rivers usually approach California from the southwest, bringing warm, moist air from the tropics.
Atmospheric river
Duration
A megastorm can last up to 40 days and meander down the coastline. Smaller rivers that arrive each year typically last two to three days; "pineapple expresses" come straight from the Hawaii region.
250 miles
1 mile
Vapor Transport
Moisture is concentrated in a layer 0.5 to 1.0 mile above the ocean. Strong winds within the layer bring very humid air from the tropics, but the river can also pull in atmospheric moisture along its path.


Integrated Water Vapor from GFS valid Feb 05, 2015 00 UTC
1
2
3
4
5
6
7 cm

Questions?

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